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(54) Title: SORBENT MATERIAL HAVING A COVALENTLY ATTACHED PERFLUORINATED SURFACE WITH FUNCTIONAL GROUPS

(57) Abstract: The present invention relates to a sorbent material having a solid support substantially modified with a fluorinated polymer coating which is covalently attached to the support and the fluorinated polymer coating is containing at least one functional group, methods of obtaining the sorbent material, the use of these materials for separation of substances, a chromatographic column or cartridge at least partially filled with the sorbent material of the invention, a membrane-like device comprising the sorbent material of the invention, a device comprising the sorbent material of the invention in loose form as well as a miniaturized device comprising the sorbent material.

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/12517

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
RU 2080905	C	10-06-1997	RU	2080905 C1	10-06-1997
WO 0196556	A	20-12-2001	AT AU AU CA DE EP WO JP US	259850 T 5381700 A 6408401 A 2376429 A1 60008380 D1 1194479 A1 0196556 A1 2003502465 T 6573307 B1	15-03-2004 02-01-2001 24-12-2001 21-12-2000 25-03-2004 10-04-2002 20-12-2001 21-01-2003 03-06-2003
US 5079155	A	07-01-1992	US US CA DE DE DK EP IE JP JP JP	4885250 A 4954444 A 1321768 C 3884016 D1 3884016 T2 108588 A 0281368 A2 63200 B1 1791987 C 5001714 B 63294784 A	05-12-1989 04-09-1990 31-08-1993 21-10-1993 20-01-1994 03-09-1988 07-09-1988 05-04-1995 14-10-1993 08-01-1993 01-12-1988
EP 0621074	A	26-10-1994	CA DE DE EP JP JP US	2121747 A1 69419448 D1 69419448 T2 0621074 A1 2871435 B2 6308109 A 5773587 A	23-10-1994 19-08-1999 30-03-2000 26-10-1994 17-03-1999 04-11-1994 30-06-1998
SU 1839325	A	10-11-1995	SU	1839325 A1	10-11-1995
WO 0041807	A	20-07-2000	EP AT AU CA DE DE WO EP ES JP	1020220 A1 229842 T 2288800 A 2360322 A1 60001053 D1 60001053 T2 0041807 A1 1148945 A1 2188501 T3 2002534258 T	19-07-2000 15-01-2003 01-08-2000 20-07-2000 30-01-2003 25-09-2003 20-07-2000 31-10-2001 01-07-2003 15-10-2002
EP 0535376	A	07-04-1993	JP AU CA EP	5060761 A 2121492 A 2077157 A1 0535376 A1	12-03-1993 04-03-1993 01-03-1993 07-04-1993
US 4160728	A	10-07-1979	BE CA CH DE DK FR GB IE	861589 A1 1101827 A1 634661 A5 2754252 A1 544977 A 2373316 A1 1592885 A 45932 B1	07-06-1978 26-05-1981 15-02-1983 15-06-1978 09-06-1978 07-07-1978 08-07-1981 29-12-1982

## INTL NATIONAL SEARCH REPORT

## Information on patent family members

International Application No

PCT/EP 03/12517

Patent document cited in search report	Publication date	Patent family member(s)			Publication date
US 4160728	A	IT	1089344 B		18-06-1985
		JP	1010779 B		22-02-1989
		JP	1537302 C		21-12-1989
		JP	53071899 A		26-06-1978
		LU	78658 A1		11-07-1978
		NL	7713517 A		12-06-1978
		SE	442591 B		20-01-1986
		SE	7713892 A		09-06-1978
US 5522994	A	04-06-1996	NONE		
EP 0648777	A	19-04-1995	US	5438129 A	01-08-1995
			DE	69421886 D1	05-01-2000
			DE	69421886 T2	27-04-2000
			EP	0648777 A1	19-04-1995
			JP	2596716 B2	02-04-1997
			JP	7184652 A	25-07-1995
			US	5625054 A	29-04-1997

## INT'L NATIONAL SEARCH REPORT

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PCT/EP 03/12517

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 B01J20/32 G01N30/48 B01D15/08

According to International Patent Classification (IPC) or to both national classification and IPC

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal, PAJ, COMPENDEX, INSPEC, BIOSIS

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
Y ✓	<p>DATABASE WPI    Section Ch, Week 199807    Derwent Publications Ltd., London, GB;    Class A89, AN 1998-075292    XP002277064    &amp; RU 2 080 905 C (BIOORGANIC CHEM INST),    10 June 1997 (1997-06-10)    abstract</p> <p>---</p> <p>WO 01/96556 A (PROMETIC SCIENCES)    20 December 2001 (2001-12-20)</p> <p>page 4, line 29 - line 33    page 4, line 8 - line 10    page 4, line 19    page 6, line 1 - line 10    page 10; example 9    claim 10</p> <p>---</p> <p>---</p>	1,2,6-9, 12, 14-18,21
Y ✓		1,2,6-9, 12, 14-18,21

Further documents are listed in the continuation of box C

Patent family members are listed in annex.

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## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/EP 03/12517

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A ✓	US 5 079 155 A (G.B. COX) 7 January 1992 (1992-01-07) column 4, line 53 - line 56 column 4, line 63 -column 5, line 2 column 5, line 45 - line 50 column 8, line 6 - line 10 column 9, line 7 - line 25 ---	3,22,23
A ✓	EP 0 621 074 A (E.I. DU PONT DE NEMOURS AND COMPANY) 26 October 1994 (1994-10-26) column 3, line 14 - line 18 column 7, line 31 - line 50 ---	1,3,6,7, 9,16-18, 20,21
A ✓	DATABASE WPI Section Ch, Week 199627 Derwent Publications Ltd., London, GB; Class A14, AN 1996-267181 XP000222720 & SU 1 839 325 A (BIO-ORG CHEM INST), 10 November 1995 (1995-11-10) abstract ---	1,2,6-8, 12, 15-18,21
A ✓	DATABASE BIOSIS 'Online! BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; November 1998 (1998-11) KAPUSTIN D V ET AL: "Composite fluoropolymer-containing sorbents for isolation and purification of biopolymers" Database accession no. PREV199900110788 XP000217877 abstract & BIOORGANICHESKAYA KHIMIYA, vol. 24, no. 11, November 1998 (1998-11), pages 868-876, ISSN: 0132-3423 ---	1,2, 16-18,21
A ✓	WO 00/41807 A (MIRA DIAGNOSTICA GMBH) 20 July 2000 (2000-07-20)	1,2,6,7, 16-18, 20,21
A	claims 1,2,7-9 & EP 1 148 945 B (NEXTEC) 18 December 2002 (2002-12-18) cited in the application claims 1,2,7-9 ---	1,2,6,7, 16-18, 20,21
A ✓	EP 0 535 376 A (IMMUNOBION LTD) 7 April 1993 (1993-04-07) claims 1,8,9,12 ---	1,11,16, 19
A ✓	US 4 160 728 A (J.J. KIRKLAND) 10 July 1979 (1979-07-10) column 6, line 57 - line 61 column 2, line 42 - line 48 ---	4,5

## INT'L. NATIONAL SEARCH REPORT

International Application No  
PCT/EP 03/12517

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A✓	US 5 522 994 A (J.M.J. FRECHET) 4 June 1996 (1996-06-04) column 5, line 8 - line 15 column 5, line 57 -----	4, 5
A -	EP 0 648 777 A (BECTON DICKINSON CO) 19 April 1995 (1995-04-19) -----	